THE MOSQUITOES, GNATS, CRANEFLIES, MIDGES AND FLIES

of the

NORTHERN STATES

by

EDW. KNOBEL.

BIOLOGICAL LABORATORY
WOODS HOLE
LIBRARY

QL
535
K 69

E WHIDDEN, PUBLISHER, 18 ARCH STREET, BOSTON.

Marine Biological Laboratory

Received Sept., 1941

Accession No. 54125

Given By Dr. R. P. Bigelow
Massachusetts Institute of Technology

Place, Cambridge, Mass.

MOSQUITOES, GNATS, CRANEFLIES, MIDGES AND FLIES OF THE NORTHERN STATES

By EDWARD KNOBEL

BOSTON: PUBLISHED BY BRADLEE WHIDDEN

Copyright, 1897,
BY
BRADLEE WHIDDEN.

INTRODUCTION.

The mosquitos, gnats, flies, ticks, and fleas constitute the order *Diptera* of the class Insecta. They have only two wings (a few wingless excepted); in place of hind wings, they have a minute hair with a knob on the end of each called the balancers; mostly covered by a scale when at rest. Their mouth parts are formed for sucking or lapping, never for biting, though often enclosed in sharp horny needles for piercing; some have their tongues enclosed in a soft trunk. Their food is always liquid. They lay their eggs inthe water, on fruit or on various growing or decaying vegetable or animal matter, on which their larvæ, footless maggots live. The maggots when full grown transform to pupa, mostly enclosed in their own dried skin, though some times naked.

In 1833, Dr. T. W. Harris counted 247 kinds in Massachusetts. Now over 2500 are named, and as in Europe, 10,000 are known to exist, a similar number may be expected in the United States.

Many kinds appear in countless swarms and as a veritable plague, but some are useful.

The order *Diptera* has been divided into sub-orders by the way the fly opens the pupa when leaving it; but as the pupa is rarely met with, the old way of dividing the order by the various number of joints in their feelers (*antennæ*) is more convenient. The sub-orders are divided into families by the variations of the veins in their wings.

54125

I. Sub-Order NEMATOCERA. *Feeler, except the first two joints, composed of many similar joints.*

This comprises the mosquitoes, gnats and midgets, — all more or less mosquito-like, with slender bodies, long legs and small heads and eyes. Generally of delicate build, though gradually approaching the next division.

II. Sub-Order BRACHYCERA. *Feeler short, of few and unequal joints; sometimes a bristle at the end.*

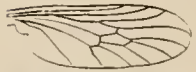
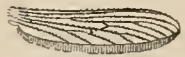
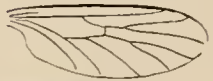
This comprises the various flies, all more or less like the house fly, though some resemble wasps, bees or bumblebees: generally of robust build, strong bodies, stout legs; head and eyes large.

III. Sub-Order PUPIPARA. *Parasites on animals, which they seldom leave.*

Instead of developing from the egg to the maggot, pupa and fly, like all the foregoing, the female gives birth to the pupa, from which the insect is transformed.

OBSERVE THE WING. The veins running from the shoulder to the edge are called *length-veins*; those from one vein to another, *cross-veins*: a space enclosed by veins is called a *cell*. On some wings a vein splits into two or more branches; then it is called *forked*. Do not count the cells which border one side on the edge of the wing, nor those from the first cross-vein to the shoulder: only those in the middle of wing.

KEY TO SUB-ORDER I. MOSQUITO-LIKE DIPTERA.

		PAGE	
Wing with three or more cells; a V-shaped seam on chest point: wing long and narrow	TIPULIDÆ.	11.	
no V-shaped seam; wing broad	RHYPHIDÆ.	6.	
Wing with two cells; some of the veins from cell to edge forked: veins covered with scales	CULICIDÆ.	8.	
veins not covered with scales	DIXIDÆ.	10.	
veins not forked	BIBIONIDÆ.	28.	
Wing with one cell; with irregular net-like veins on the edge	BLEPHAROCERIDÆ.	20.	
with forked veins from cell to edge	MYCETOPHILIDÆ.	20.	
few veins only; wing narrow, with no distinct cell	CHIRONOMIDÆ.	10.	
Wing with only few veins; the hindmost forked	CECIDOMYIDÆ.	21.	
Wing with hardly any veins, except on front edge	SIMULIIDÆ.	23.	
Wing with many veins; several forked	PSYCHODIDÆ.	8.	

KEY TO SUB-ORDER II. FLY-LIKE DIPTERA.

Wing with more than six closed cells:

veins at point running parallel with the hind edge, and curved to the front edge - - - MYDAIDÆ. PAGE 30.

veins running into edge - - NEMESTRINIDÆ. 36.

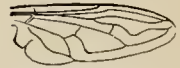
Wing with six closed cells:

five veins end in hind edge - - - ACROCERIDÆ. 36.

four veins end in hind edge - BOMBYLIIDÆ. 36.

two veins end in hind edge - - - CONOPIDÆ. 46.

one vein ends in hind edge - - - - SYRPHIDÆ. 39.



Wing with five closed cells:

first vein running parallel with front edge - ASILIDÆ. 30.

two cells end in hind edge - - THEREVIDÆ. 30.

one cell ends in front edge - - XYLOPHAGIDÆ. 28.

Wing with four closed cells:

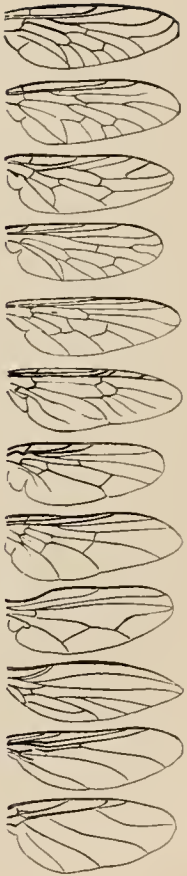
one nearly closed cell at point - - MUSCIDÆ. 50.

PIPUNCULIDÆ. 47.

PLATYPEZIDÆ. 47.

Wing with four cells:

		PAGE
one vein from cells to edge forked; one fork branch curves to front edge	TABANIDÆ.	24.
both branches end in hind edge	LEPTIDÆ.	27.
both branches end in front edge	SCENOPINIDÆ.	47.
both branches end at point	DASYPOGON IN ASILIDÆ	31.
not forked	EMPIDIDÆ.	35.
veins from cell end before reaching edge	STRATIOMYIIDÆ.	38.
only few veins in hind legs	ANTHOMYIDÆ.	54.
Wing with three closed cells:	OESTRIDÆ.	60.
Wing with one or two closed cells:	DOLICHOPODIDÆ.	48.
Wing with one closed cell:	LONCHOPTERIDÆ.	47.
Wing with few veins and no definite cell:		
	HIPPOBOSCIDÆ. OLFERSIA.	62.
	PHORIDÆ.	60.



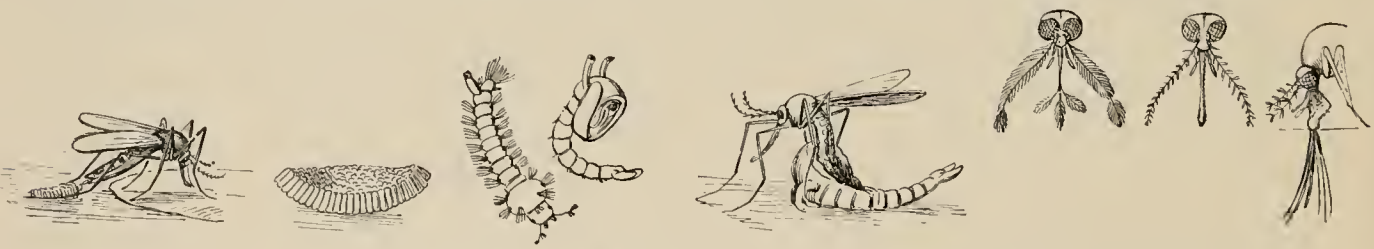
I. SUB-ORDER NEMATOCERA.

MOSQUITO-LIKE FLIES.

Family 1. PSYCHODIDÆ. *Moth-like Flies.* The Psychodas are small moth-like flies, sometimes found running on windows. Their bodies and wings are covered with hairs. Little is known of their habits. They are interesting as the connecting link between moths and flies.

1. *Psychoda alternata.* $\frac{1}{16}$ in.; yellowish white, body brownish, wing banded, dotted with black.

Family 2. CULICIDÆ. *Mosquitoes. Stinging Gnats.* The males neither sing nor sting, but dance; and their food is unknown. They are easily recognized by their feather-like feelers. The feelers of the females are hairy though less feather-like. Their eggs are laid in a boat-shaped mass on the surface of stagnant water on which it floats. In a few days these hatch and the larvæ wiggle out on the water side of the boat, grow rapidly, and have a breathing tube on the joint before the last of the tail. When full grown they change to pupa, and at the same time they develop two breathing tubes on the chest part, and lose that of the tail. After a few days the



pupa bursts on the back, and the mosquito crawls out and rides on the cast off skin till its wings are hardened enough to fly away. A mosquito's mouth is composed of six pieces and a sheath: three fine needle-pointed hairs form the underlip, two stronger ones with barbed points, the upperlip; these five form a tube enclosing the tongue. The mosquito differs from the following families not only in the veins of the wing, but also by having a long fringe on the hind edge, and scales on the veins.

CULEX. Mosquito.

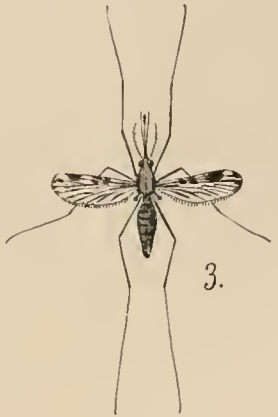
2.

1. *C.* (*Megarhina*) *ferox.* $\frac{3}{8}$ in.; head brown, with green gold shine; chest chestnut; body, legs and trunk steel blue, golden below.
2. *C. ciliatus.* $\frac{5}{16}$ in.; brown; chest yellow, black striped; legs yellow, with black and white bands.
3. *C. fasciatus.* $\frac{3}{16}$ in.; brown; feet with white bands; wings transparent, brown veins.
4. *C. tainiorhynchus.* $\frac{3}{16}$ in.; brown; a white band across middle of trunk; joints of feet white.
5. *C. pungens.* $\frac{3}{16}$ in.; reddish brown; body brown, with yellow edges on the rings.
6. *C. tainiatus.* $\frac{1}{8}$ in.; brown; chest with three dark stripes; feeler of male with four, of female with two white bands; body brown, edges of ring yellowish, and a white spot; legs dark brown; two white bands on fore feet, and five on hind feet.
7. *C. triseriatus.* $\frac{3}{16}$ in.; brown; chest blackish above, sides white, hairy, body with three rows of triangular white spots on each ring; front edge of wing brown.
8. *C.* (*Psorophora*) *boscii.* $\frac{1}{4}$ in.; pale yellow, brownish legs and hairy veins, two scales on the fore part of chest.

5

ANOPHELES. Fork gnat.

1. *A. crucians.* $\frac{3}{16}$ in; brownish; chest with three dark lines, body gray, hairy; veins of wing brown; wing spotted.
2. *A. ferruginosus.* $\frac{3}{16}$ in.; rusty brown; body blackish brown, with yellowish hair; no marks on chest or wings except veins.
3. *A. quadrimaculatus.* $\frac{5}{16}$ in.; gray, a brown stripe on each side of chest, two larger and two small brown spots on each wing.


3.

CORETHRA. Bushy gnat.

1. *C. punctipennis.* $\frac{1}{4}$ in.; whitish, with brown dotted wings and legs; chest with three yellowish brown stripes.

Family 3. CHIRONOMIDÆ. *Midges.* Like the mosquito, with smooth wings. The feelers in the males are extremely feathery. They appear early in the Spring, before the snow melts. Some kinds bite like mosquitoes.

CHIRONOMUS. Feather midge.

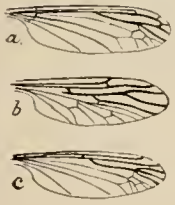
1. *Ch. cristatus.* 3/8 in.; yellowish, with three ash gray stripes; body with brown bands; legs yellowish.
2. *Ch. glaucurus.* 3/8 in.; whitish, chest part with three reddish stripes; body reddish with whitish bands and end ring with black dot.
3. *Ch. lobifer.* 3/8 in.; whitish, with three brown stripes on chest part; body black with grayish bands; wing with faint brown dot.
4. *Ch festivus.* 1/4 in.; greenish, with rust-yellow stripes; body with black bands.
5. *Ch. lineola.* 3/8 in.; greenish, chest part with one black, and two yellow lines in the middle.
6. *Ch. oceanicus.* 3/8 in.; found on eelgrass and seaweeds.
7. *Ch. tainiotus.* 1/4 in.; bright green.
8. *Ch. modestus.* 3/16 in.; green, with yellow stripes; wing white with front veins and point brown; joints of feet brown.

Family 4. DIXIDÆ. *Wood Midges.* Mosquito-like, but differs in venation of wings. Is found in shady swamps on skunk cabbage.

DIXA. Wood midge.

Family 5. TIPULIDÆ. *Cranefties. Gnats.* Easily recognized by the V-shaped seam on the upper chest, between the wings and the very long fragile legs. Their larvæ are grub-like, gray, brown or white, and live in rotten wood, mould, earth or fungi, on leaves or in the water, feeding on water-plants.

KEY TO THE TIPULIDÆ.



Observe: If the first length-vein from the edge of the wing turns at its end into the next vein, and does not connect with the edge; and if this second vein, at the point of the wing, turns into the next vein (*fig. a.*): - *Ctenophora* and *Tipula*

If the first length-vein runs into the edge of the wing and there connects by a cross-vein with the next vein; and if this second vein at the point runs into the edge of the wing (*fig. b*):

And if the third vein, branching from the middle of the second vein runs with two ends into the edge (*fig. b*):

With no spurs at the end of shank - - - - - - - - - - - - *Limnobina.*

With spurs at the end of shank - - - - - - - - - - - - *Cylindrotomina.*

Or, if the third vein branches again and runs with three ends into the edge (*fig. c*):

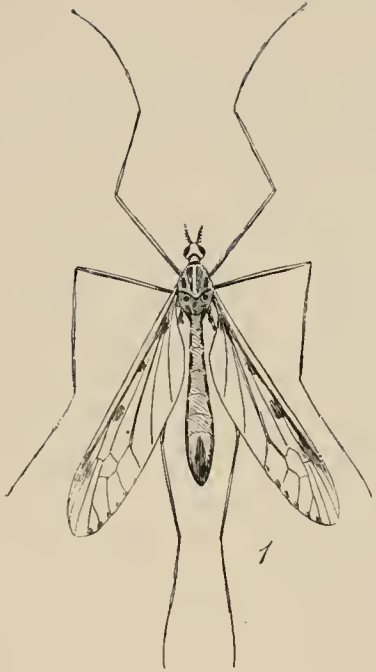
With no spurs at the end of shank - - - - - - - - - - - - *Eriopterina.*

With spurs at the end of shank, and a long snout - - - - - - - - - *Ptychopterina.*

If the cross-vein connecting the second vein with the first is before, nearer the point of the wing, where the third vein branches from the second (*fig. b*): - - - - - - - - - - *Limnophilina* and *Anisomerina.*

Or, if the cross-vein connecting the second vein with the first is behind, nearer the shoulder of the wing, where the third vein branches from the second (*fig. c*): - - - - - - - - - - - - *Amalopina*

I. TIPULINA.



CTENOPHORA. Comb Cranefly.

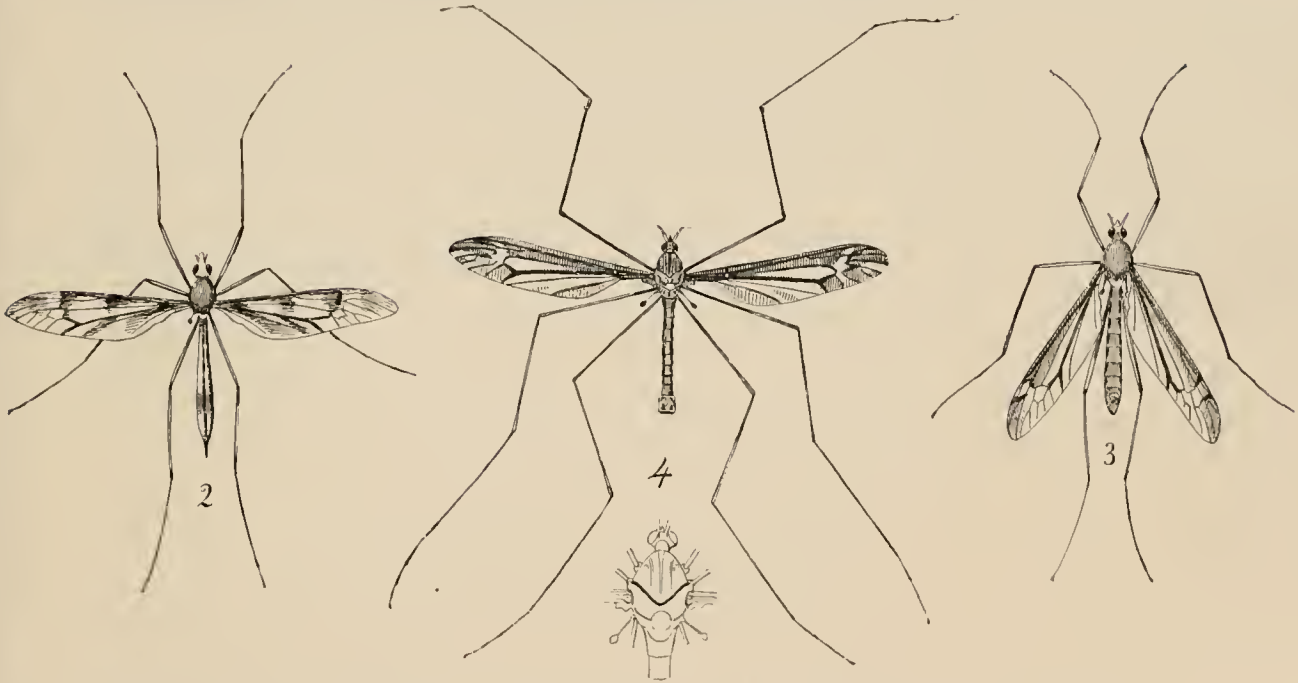
Feeler comb-like, feathered on one side only.

1. *Ct. abdominalis.* 1¼ in.; pale brown, with brown stripes on chest; body rust yellow, a brown line on each side and end rings brown; wings clear, with brown marks.
2. *Ct. nubicule.* ⅝ in.; orange and brown, fore part of chest and head whitish; wing clear, with yellowish brown veins.

TIPULA. Daddy-long-legs Cranefly.

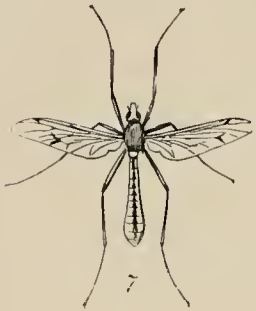
1. *T. tephrocephala.* 1¼ in.; yellowish brown, with a dark spot-stripe on body, like a large *T. angustipennis.*
2. *T. trivittata.* 1 in.; chest ash gray, with brown stripes; body yellowish, with three brown stripes; wing with four brown bands.
3. *T. strepens.* ⅞ in.; yellowish brown; no stripes on chest, but a spot-stripe on each side of body.
4. *T. tricolor.* ⅞ in.; brown; sides ash gray; body striped; wing with a white spot in the middle.
5. *T. breviventris.* ⅞ in.; ochre brown with three stripes; the very long legs white at the joints.
6. *T. cunctans.* 13/16 in.; brownish, body yellow with brown stripes; wing light brown.

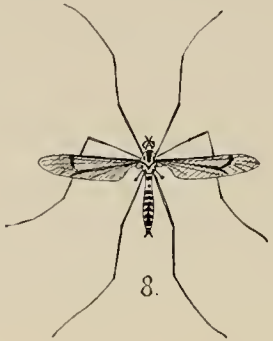
7. *T. angustipennis.* ¾ in.; yellowish brown; nowhere dark except middle stripe on body.
8. *T. maculipennis.* ¾ in.; gray, brown striped: wings light smoky color.



9. *T. flavicans.* ⅝ in.; gray, sides of body yellow brown; wing yellowish, with brown spots.
10. *T. costalis.* ½ in.; yellowish brown; feeler black banded; legs brown.

11. *T. macrocera.* $\frac{7}{16}$ in.; yellow, with long feelers; body, sides and belly black dotted.
12. *T. colaris.* $\frac{7}{16}$ in.; yellow, with black stripes; body with black bands.


7


8.

9.

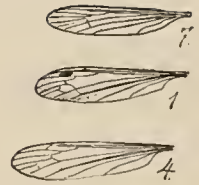
13. *T. ferruginea.* $\frac{7}{16}$ in.; yellow, brown striped; body with triangular brown spots.
14. *T. annulata.* $\frac{3}{8}$ in.; brownish; body yellowish, with brown bands.

II. LIMNOBINA. Meadow Craneflies.

DICRANOMYIA. *Feet slender.*

1. *D. pubipennis.* $\frac{3}{8}$ in.; dark brown; wing plain.
2. *D. defuncta.* $\frac{3}{8}$ in.; gray brown, chest with three brown stripes; upper shanks with a white ring; wing brown-spotted in rows.

3. *D. liberta.* $\frac{5}{16}$ in.; gray; chest brown-striped; feeler black; wing clear.
4. *D. haeretica.* $\frac{5}{16}$ in.; drab-colored; chest striped; feeler black; snout yellow; wing transparent, with a grayish tint.
5. *D. badia.* $\frac{5}{16}$ in.; brown; body with light bands; wing clouded-brown.
6. *D. morioides.* $\frac{5}{16}$ in.; black; brownish body and wing.
7. *D. longipennis.* $\frac{1}{4}$ in.; buff; chest reddish, with three dark stripes; wing clear.
8. *D. immodesta.* $\frac{1}{4}$ in.; buff; chest with one brown stripe; wing clear.
9. *D. rostrifera.* $\frac{1}{4}$ in.; brown; with one dark stripe on chest; snout long; wing clear.



GERANOMYIA. *Snout longer than head and chest.*

10. *G. rostrata.* $\frac{3}{8}$ in.; gray; feeler black; wing with five brown spots and clouds; snout long.
11. *G. diversa.* $\frac{1}{4}$ in.; gray; chest with three dark-brown stripes; snout short; wings lightly brownish tinted.

RHIPIDIA. *Feeler comb-like.*

12. *R. maculata.* $\frac{3}{8}$ in.; grayish brown; chest with one brown stripe; wing with brown spots, largest on front.
13. *R. fidelis.* $\frac{3}{8}$ in.; grayish brown; chest with a brown stripe; wing clouded with brown.
14. *R. domestica.* $\frac{3}{8}$ in.; head gray; chest yellowish, silky-brown; wing with five spots on middle vein and clouded.

LIMNOBIA. *Feet stout.*

15. *L. cinctipes.* $\frac{1}{2}$ in.; yellow; chest with four brown stripes; upper shanks with two brown bands; wing yellowish, with brown clouds and spots, four on front edge
16. *L. immatura.* $\frac{1}{2}$ in.; like last, with three bands on upper shanks.
17. *L. solitaria.* $\frac{1}{2}$ in.; yellow; chest with a light-dark bordered stripe; wing clouded and dotted with brown.
18. *L. indigena.* $\frac{7}{16}$ in.; yellowish; head black; chest brown striped; wing brown-clouded.
19. *L. parietina.* $\frac{5}{8}$ in.; brown; chest with dark stripes; wing long and broad with pale-brown clouds, streaks and spots.
20. *L. triocellata.* $\frac{3}{8}$ in.; reddish yellow; chest with black lines and dots; wing yellowish, three brown spots.

TROCHOBOLA.

21. *T. argus.* ¼ in.; yellowish brown; chest with three brown stripes; wings yellowish or whitish with brown eye-spots, mostly on the edge of wing.

21

RHAMPHIDIA. *Snout as long as head.*

22. *R. flavipes.* ¼ in.; brown; shanks and feet darker; wing transparent, clouded with brown; snout shorter than chest.

ELEPHANTOMYIA.

23. *E. westwoodi.* ⅜ in.; yellow buff; shanks brown; feet yellow; snout as long as body.

TOXORRHINA.

24. *T. muliebris.* ⅜ in.; dark gray; feet pale-reddish; snout long; wing clear.

DICRANOPTYCHA. *Snout shorter than head.*

25. *D. germana.* $\frac{1}{16}$ in.; brownish yellow; feet reddish; wing blueish.

ANTOCHA.

26. *A. opalizans.* ¼ in.; yellowish gray; chest with reddish stripes; wing with a whitish tinge.

26

III. ERIOPTERINA.

RHYPHOLOPHUS. *Wing hairy; no spurs on shanks.*

1. *R. nubilus.* ¼ in.; gray; chest with a brown stripe; wing clouded-gray.

ERIOPTERA. *Only veins hairy.*

2. *E. septentrionis.* ¼ in.; yellowish brown; more or less bright yellow on chest and body; wing not spotted.
3. *E. chlorophylla.* ¼ in.; pale green; eyes black.
4. *E. vespertina.* ¼ in.; yellow; chest reddish; wing not spotted.
5. *E. venusta.* ¼ in.; brown; chest reddish; wing yellow, with two brown bands.
6. *E. caloptera.* ¼ in.; brownish yellow; chest whitish above; wings brownish, with transparent spots.

1.

4.

TRIMICRA.

5.

7. *T. anomala.* $\frac{5}{16}$ in.; brownish gray; chest with three brown lines; wings not spotted, but tinted slightly brownish.

8.

SYMPLECTA.

8. *S. punctipennis.* ¼ in.; gray; chest with three brown stripes; wing whitish, cross veins clouded brown.

GNOPHOMYIA.

9. *G. tristissima.* $\frac{5}{16}$ in.; black; knob of balancers yellow; wing semi-transparent.

9.

GONIOMYIA. *Wing not hairy.*

10.

10. *G. sulphurella.* ¼ in.; sulphur yellow; wing slightly grayish, variegated with brown.
11. *G. blanda.* ¼ in.; gray, with yellow edges; chest with two brown stripes; wing clouded.

CLADURA.

12. *Cl. indivisa.* $\frac{5}{16}$ in.; yellow; sides spotted; body with brown bands; wings yellow with reddish tinge.

13.

CHIONEA.

13. *Ch. valga.* Reddish; wingless; found on the snow.

IV. LIMNOPHILINA.

EPIPHRAGMA. *Veins of wing not hairy.*

1. *E. fascipennis.* $\frac{7}{16}$ in.; brown, with yellowish and reddish variations; wing with dark outlined pale-brown spots.

LIMNOPHILA.

2. *L. rufibasis.* $\frac{7}{16}$ in.; yellowish gray; wing pale-brownish; legs reddish.
3. *L. adusta.* $\frac{3}{8}$ to $\frac{1}{2}$ in.; yellow; chest reddish; point of wing brown.

4. *L. macrocera.* $\frac{3}{8}$ in.; glossy black; wings brown-spotted.
5. *L. poetica.* $\frac{3}{8}$ in.; reddish yellow; wings not spotted.

6. *L. tenuipes.* $\frac{3}{8}$ in.; brown; body yellowish: wing not spotted, but brown-tinted.
7. *L. recondita.* $\frac{3}{8}$ in.; yellowish red; glossy.

8. *L. montana.* $\frac{3}{8}$ in.; gray; chest with four brown stripes; wings brown-spotted.
9. *L. luteipennis.* $\frac{5}{16}$ in.; brownish, with a brown stripe in middle; wings clouded-brown.
10. *L. inornata.* $\frac{5}{16}$ in.; brown; breast gray; wing clouded.
11. *L. ultima.* $\frac{5}{16}$ in.; gray; chest with four brown stripes; wing transparent and unspotted.
12. *L. aprilina.* $\frac{1}{4}$ in.; grayish; body brown; wing with six or seven spots near the front edge.
13. *L. fuscovaria.* $\frac{1}{4}$ in.; grayish; body brown; wing thickly dotted with brown; spots largest near front.
14. *L. tenuicornis.* $\frac{1}{4}$ in.; black, with gray bloom; wing not spotted.
15. *L. munda.* $\frac{1}{4}$ in.; black; wing brownish; feet yellow.

TRICHOCERA. Winter Gnat.

16. *T. bimacula.* $\frac{1}{4}$ in.; yellowish gray; chest with brown stripes; wings with two brown clouds.

17. *T. scutelata.* $\frac{3}{16}$ in.; blackish brown; end of chest white.

ERIOCERA.

18. *E. spinosa.* ½ to ⅞ in.; brownish; chest with brown stripes; wings reddish: feeler of male twice the length of body, beset with spines.
19. *E. longicornis.* ½ in.; dark-gray; chest with black stripes; feeler twice the length of body.

V. AMALOPINA — CYLINDROTOMINA — PTYCHOPTERINA.

AMALOPIS.

1. *A. inconstans.* ½ in.; yellowish or brownish; chest and wing reddish.
2. *A. auripennis.* ½ in.; brownish; wings yellow.
3. *A. calcar.* ½ in.; yellow; chest reddish, to transparent yellow.
4. *A. vernalis.* ⅜ in.; brownish; wings with brown spots.

PEDICIA.

5. *P. albivitta.* 1⅛ to 1⅜ in.; brown, silvery; chest with a double-brown stripe, wing transparent with a brown band on front edge and one in middle of wing; a row of brown spots on five segments of the body.

CYLINDROTOMA.

6. *C. americana.* $\frac{7}{16}$ in.; yellow; chest black striped; wing transparent.
7. *C. nodicornis.* $\frac{7}{16}$ in.; dark yellow; chest black striped; head black.

PHALACROCERA.

8. *P. tipulina.* ½ in.; brownish; chest dark gray with indistinct dark-brown stripes; wings with gray-brown tinge.

PTYCHOPTERA.

9. *P. ruficincta.* $\frac{5}{16}$ in.; black; body with reddish bands; feet reddish; wing with a brown spot near shoulder, and three brown bands.

BITTACOMORPHA.

10. *B. clavipes.* $\frac{9}{16}$ in.; black; front of head white; chest with white stripe in middle, and sides white; wing transparent.

9.

10.

10

Family 6. RHYPHIDÆ. *Strap Midges.* Like *Tipulids*, without the V-shaped seam on chest-part.

DILOPHUS, Ray Midge.

1. *D. thoracicus.* $\frac{1}{4}$ in.; horny yellow; body and legs black; wing smoky.
2. *D. orbatus.* $\frac{3}{16}$ in.; shiny black with green smoky wings.

RHYPHUS. Strap Midge.

3. *R. alternatus.* $\frac{1}{2}$ in.; brown; three stripes, with three brown and three white spots.
4. *R. marginatus.* $\frac{3}{16}$ in.; gray, with three reddish stripes; body brown with whitish edges.
5. *R. scalaris.* $\frac{1}{4}$ in.; honey yellow; bands and tail-end black.

Family 7. BLEPHAROCERIDÆ. *Net-winged Midges.* Like mosquitoes, their larvæ live in swift-flowing streams and are there easily seen, as they are a conspicuous black.

Family 8. MYCETOPHILIDÆ. *Fungus Gnats* Their larvæ feed on fungi, decaying vegetable matter, and some upon ripe fruit. They live often in great numbers together. In the venation of the wing there is often much variation. They appear like short-legged, strongly-built mosquitoes.

HETEROMYIA.

1. *H. fasciata.* $\frac{3}{16}$ in.; greenish; wing with brown bands.

SCIOPHILA. Shade Gnat.

1. *S. bifasciata.* $\frac{3}{8}$ in.; brownish yellow with black lines, with two blackish bands.
2. *S. fasciata.* $\frac{3}{4}$ in.; yellowish; with three stripes; body with brown bands.

MYCETOPHILA. Fungus Gnat.

1. *M. sericea.* $\frac{3}{16}$ in.; brown, with whitish-silky bloom; body yellow-edged.
2. *M. maculipennis.* $\frac{3}{16}$ in.; yellow, with three striped wings with three brown spots.

SCIARA. Mourning Gnat.

1. *S. fulviventris.* $\frac{3}{8}$ in.; black; waist yellow, hairy.

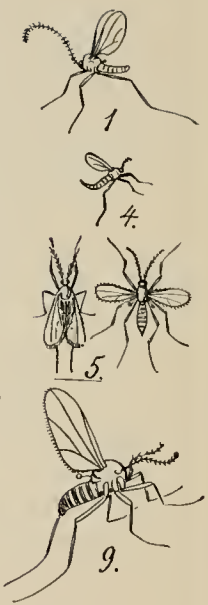
Family 9. CECIDOMYIDÆ. *Gall Gnats.* Small, often very small flies, which cause the curious outgrowth on many plants, as on the willow, blueberry, etc. Some kinds are very injurious to the crops.

DIPLOSIS.

1. *D. maccus.* $\frac{1}{8}$ in.; yellowish; chest reddish-striped; legs and feelers black-banded; wing with violet spots.
2. *D. caryæ.* Pale, with gray and black stripes. On hickory trees.

CECIDOMYIA. Gall Gnat.

1. *C. solidaginis.* $\frac{3}{16}$ in.; reddish; body with black bands; wing blackish, hairy. On stem of goldenrod.
2. *C. hirtipes.* Bright red, with black hair.
3. *C. serrulata.* Brown. On alder.
4. *C. chrysopsidis.* $\frac{1}{8}$ in.; red; wing gray, hairy. On golden aster.
5. *C. destructor.*—The Hessian fly. $\frac{1}{10}$ in.; black; body tawny, with black rings; wings black. In the stems of wheat, which causes it to stunt in growth.
6. *C. tritici.*—The wheat midge. $\frac{1}{12}$ in.; like the last, but wings transparent. Attacks the ear of wheat.
7. *C. robiniæ.* $\frac{3}{20}$ in.; forms swellings in the locust stems.
8. *C. grossulariæ.* Causes the gooseberries to turn premature red and rot.
9. *C. salicis-rigidæ.* $\frac{1}{5}$ in. On willows.
10. *C. strobiloides.* Causes the pine cone-like end-buts on willows. *C. albovittata* lives in them.
11. *C. pini-inopis.* Attacks the needles of the pine trees.
12. *C. ornata.* $\frac{1}{16}$ in.; body red; wings with five brown spots.
13. *C. trifolii* and *C. leguminicola.* In clover-leaves.



LASIOPTERA. Edged Midge.

14. *L. ventralis.* $\frac{1}{16}$ in.; blackish-brown, with yellow legs; front edge of wing black.
15. *L. vitis.* $\frac{1}{16}$ in.; red; black head. On grape vines.

Family 10. SIMULIIDÆ. *Black Flies.* Unlike the foregoing families, they like hot sunshine, and they are one of the greatest pests where they abound. Their larvæ live in swift-flowing streams. Their feelers are short, but composed of many joints; their body more robust, and legs stout, but heads small. This family and the next connect the mosquito tribe with the flies.

SIMULIUM. Black Fly.

1.

1. *S. molestum.* $\frac{3}{16}$ in.; the Adirondack black fly, which is very bloodthirsty.
2. *S. innoxium.* $\frac{3}{16}$ in.; does not bite.
3. *S. pecuarum.* The southern Buffalo-gnat.
4. *S. meridionale.* The Turkey-gnat.

Family 11. BIBIONIDÆ. *March Flies. Hair Midge.* Like last family, but differs in veins of wing. Does not bite, and its larvæ live on roots and decaying vegetable matter.

3.

6

8

1. *B. thoracica.* $\frac{7}{16}$ in.; black; chest and shanks reddish.
2. *B. rufithorax.* $\frac{3}{8}$ in.; black; chest only yellowish-red.
3. *B. femorata.* $\frac{3}{8}$ in.; black, with yellow hair and chestnut-colored shanks.
4. *B. xanthopus.* $\frac{3}{8}$ in.; black, with yellow bloom; black legs and yellow wings.
5. *B. heteroptera.* $\frac{5}{16}$ in.; black, with smoky wings.
6. *B. albipennis.* $\frac{5}{16}$ in.; shiny black, whitish, hairy; wing white with brown veins.
7. *B. articulata.* $\frac{1}{4}$ in.; chest and legs yellow; head and body black.
8. *B. pallipes.* black; white, hairy, with yellow legs and wings.

II. SUB-ORDER BRACHYCERA.

FLIES.

Family 12. TABANIDÆ. *Horse Flies. Breeze Flies and Golden-eyed Forest Flies.* All the females are greedy bloodsuckers; a plague to man and beast. The males frequent flowers. The larvæ feed under ground on roots of grasses, and transform there in Spring. These flies resemble each other in shape.

PANGONIA. Beaked Horse Fly. Trunk Horse Fly.

1

1. *P. incisa* (*incisuralis.*) 5/8 in.; back gray with yellow hair; body brown and smooth; wing brownish.
2. *P. chrysocoma.* 1/2 to 5/8 in.; brown or pale yellow, with yellow hair.
3. *P. tranquilla.* 1/2 in.; brownish black; sides of body reddish, covered with golden-yellow hair.
4. *P. rasa.* 3/8 to 1/2 in.; feeler black, chest part black with short gray hair; body brown, with hair on last ring.

CHRYSOPS. Golden-eyed Forest Fly. *Wings with black or brown markings.*

1. *C. celer.* 3/8 in.; black; a tuft of reddish hair on each side of chest.
2. *C. excitans.* 3/8 in.; black; point of wing transparent.
3. *C. sordidus.* 3/8 in.; blackish; sides with a few yellow dots; rings of body with gray edges.
4. *C. flavidus.* 3/8 in.; brownish yellow.
5. *C. vittatus.* 3/8 in.; chest brown and yellow; body yellow, with four black lines.
6. *C. hilaris.* 3/8 in.; yellow.
7. *C. obsoletus.* 3/8 in.; brown, with three short yellow stripes on body.
8. *C. niger.* 5/16 in.; black, with red face.
9. *C. pudicus.* 5/16 in.; resembling last.
10. *C. frigidus.* 5/16 in.; black; sides of body yellow.
11. *C. quadrivittatus.* 5/16 in.; gray, with four black stripes on chest and four broken stripes on body; wings brown dotted.
12. *C. fallax.* 1/4 in.; chest gray, with black stripes; body orange, with a few black marks on end; wing black and clear.
13. *C. plangens.* 1/4 in.; blackish, with gray stripes.
14. *C. delicatulus.* 1/4 in.; black, with red head.
15. *C. fuliginosus.* 1/4 in.; black, with brown hair; wing brown, with a clear band and half-moon-shaped spots.
16. *C. lugens.* 1/4 in.; black, with yellow stripes; wing black, with a clear half-moon and small spots.
17. *C. univittatus.* 1/4 in.; brownish yellow, with one stripe.

TABANUS. Horse Fly.

1. *T. catenatus.* 1 in.; face pale yellow; feeler red; chest red brown, with distinct yellow lines; body brown.
2. *T. orion.* 1 in.; like last, but with a small triangular spot on each ring.
3. *T. atratus.* 1 in.; entirely black, with grayish bloom.
4. *T. ruficornis.* 1 in.; dark red, with a white spot on each side of body; wing clear, except on front edge.
5. *T. rufus.* 7/8 in.; yellowish red, last rings brown in the middle; wing rusty.
6. *T. nigrescens.* 7/8 in.; face brown; wing and body black.
7. *T. abdominalis.* 7/8 in.; lilac brown, with five white stripes on chest, white spots on body, and brown spots on wing.
8. *T. validus.* 7/8 in.; dark red; body with bluish shine; wing brown.
9. *T. lineatus.* 7/8 in.; brown, with rusty yellow lines; body black; wing brown.
10. *T. pallidus.* 7/8 in.; brick red; hairy underneath; oblong spots on body; wing dull.
11. *T. tectus.* 3/4 in.; chest red brown, with yellow lines; body brown.
12. *T. actaeon.* 3/4 in.; red-brown and black.
13. *T. cinctus.* 3/4 in.; chest black; first rings of body orange, with a triangular black spot on each ring.
14. *T. (stygius) affinis.* 3/4 in.; chest gray brown, with lighter lines; body black; sides of first four rings reddish yellow; wing smoky, with brown spots.
15. *T. fumipennis.* 3/4 in.; black, with yellow hair; sides of body and legs yellow.
16. *T. variegatus.* 3/4 in.; lilac reddish; body chestnut; wing brown spotted and edged.
17. *T. melanocerus.* 3/4 in.; brown; chest with five whitish stripes; body with triangular spots.
18. *T. turbidus.* 3/4 in.; reddish, with whitish stripes; body with a yellow spot-stripe; wings dull.

3.

13.

14.

19. *T. molestus.* ¾ in.; lilac-brown; white bloom on chest; body with a stripe of white triangular spots.
20. *T. crassicornis.* ¾ in.; reddish brown, with yellow stripes; body with triple white spots.
21. *T. rheinwardii.* ¾ in.; slate black, with reddish stripes; body reddish, with white spotted stripes; wing spotted.
22. *T. trispilus.* ⅝ in.; black, with gray wings.
23. *T. microcephalus.* ⅝ in.; head small; chest gray; body blackish gray, with three rows of gray spots.
24. *T. trimaculatus.* ⅝ in.; brown, with white stripes; body black, with three white triangular spots; shanks white.
25. *T. guttatus.* ⅝ in.; lilac-red, with white stripes; body brown, with triple white spots; shanks white.
26. *T. nigripes.* ⅝ in.; blackish: body with white spots on sides; legs black; wing clear.
27. *T. coffeatus.* ½ in.; face white: chest gray, with white lines; legs and body black, with lighter edges of rings.
28. *T. lineola.* ½ in.; face white; chest black, with white lines; body brownish black, with two yellow and one white stripe.
29. *T. lasiophthalmus.* ½ in.; brown; sides of body reddish yellow.
30. *T. ater.* ½ in.; black; wing brownish black.
31. *T. fulvulus.* ½ in.; gray, with yellow hair; body reddish, with triple yellow spots; wing clear.
32. *T. gracilis.* $\frac{7}{16}$ in.; lilac brown, with white stripes; body with a white stripe and side spots.
33. *T. marginalis.* $\frac{7}{16}$ in.; brown-black, with white stripes; body triple-spotted.
34. *T. costalis.* $\frac{7}{16}$ in.; gray brown, with yellow hair; body rusty brown, with a yellow stripe and side spots; wing clear.

17.

28.

29.

35. *T. nigrovittatus.* ⅜ in.; face white; chest black and gray; body with narrow black and white stripes.
36. *T. astutus.* ⅜ in.; chest gray; body blackish, with three rows of gray spots.
37. *T. annulatus.* ⅜ in.; light reddish, with white bloom; white side spots; wing clear.
38. *T. ferrugatus.* ⅜ in.; gray, with rusty edge; body rusty yellow, end with brown spots; wing clear, a brown spot on point.
39. *T. bicolor.* ⅜ in.; gray green; legs and body rusty yellow, last rings with an olive green stripe.

Family 13. XYLOPHAGI. *Wood Flies.* Their larvæ live in rotten wood.

BERIS. Ray Fly.

1. *B. dorsalis.* $\frac{3}{16}$ in.; black; waist and legs yellow.
2. *B. viridis.* $\frac{3}{16}$ in.; green bronze; body black, with yellow edge and yellow legs.

XYLOPHAGUS. Wood Fly.

1. *X. americanus.* $\frac{7}{16}$ in.; chest sulphur yellow, with a black streak and spot on each side; body reddish and yellow.

CAENOMYIA.

1. *C. pallida.* ¾ in.; rust yellow; body paler; wing with yellow veins.

Family 14. LEPTIDÆ. *Snipe Flies.* So named from some kinds which have long bills. They are sluggish flies, met in tall grass or bushes, preying on other insects. Their larvæ live in the ground in decaying wood, moss or water.

LEPTIS. Snipe Fly.

1. *L. ornata.* $\frac{7}{16}$ in.; black; edges of chest, of rings of body, and the legs, yellow.
2. *L* (*chrysopila*) *thoracica.* $\frac{7}{16}$ in.; black; chest with golden hair; body with silver spots on each side.
3. *L. albicornis.* $\frac{7}{16}$ in.; yellow, with three brown stripes on chest; body with triangular spot on each ring.
4. *L.* (*chrysopila*) *velutina.* $\frac{7}{16}$ in.; deep velvet black; wing smoky.

5. *L. vertebrata.* $\frac{3}{8}$ in.; slate gray, with white stripes; body yellow and black.
6. *L. mystacea.* $\frac{3}{8}$ in.; chest brown; body orange; wing with brown bands.
7. *L. fasciata.* $\frac{1}{4}$ in.; black; edges of chest, rings and legs yellow. Like a small *L. ornata.*
8. *L. quadrata.* $\frac{1}{4}$ in.; yellow, with three brown stripes on chest and bands on body; wing with a square brown spot.
9. *L. fumipennis.* $\frac{1}{4}$ in.; brown, with yellow bands on body and legs; wing brown.
10. *L. punctipennis.* $\frac{3}{16}$ in.; blackish brown; wing with brown spots and point.
11. *L. plumbea.* $\frac{3}{16}$ in.; lead gray; wing with brown stripes.
12. *L. basilaris.* $\frac{1}{8}$ in.; brownish black.

Family 15. THEREVIDÆ. *Stiletto Flies.* Live near the ground and prey on other insects. Their larvæ live in fungi or mould.

THEREVA. Stiletto Fly.

1. *T. frontalis.* ½ in.; black; chest with two yellow stripes; body with yellow bands.
2. *T. nigra.* $\frac{5}{16}$ in.; black; body with white edges.

Family 16. MIDAIDÆ. *Midas Flies.* They prey on other insects, and are easily known among flies by the unusually long feeler, with a knob on the end. Their larvæ live in rotten stumps.

MIDAS.

1. *M. tibialis.* 1⅛ in.; black, with yellow shanks and feet; wing brown.
2. *M. clavatus* (*filatus*). ¾ to 1¼ in.; black; second ring of body yellow; wing smoky black.
3. *M. iopterus.* ⅞ in.; black; sides and two spots on body yellowish; wing steel blue.
4. *M. fulvifrons.* ¾ in.; black; middle of body orange.

2

Family 17. ASILIDÆ. *Flies of Prey. Robber Flies.* They live on various insects and caterpillars, and even a bumblebee or dragon-fly has to succumb to their strength. Grabbing their prey with their strong legs, they suck out its juice, and leave but the shrivelled skin. Their larvæ live underground in roots or rotten wood, where they feed on other grubs.

DIOCTRIA. Hawk Fly.

1. *D. octopunctata.* ¼ in.; black; chest with yellow stripes; body with four white spots on each side; legs yellow.

DASYPOGON. Wolf Fly.

Feeler blunt at point.

2

1. *D. subulatus.* 7/8 in.; chest brown, with gray shine; body reddish, with black tail-end; legs reddish; wings brownish.
2. *D. cruciatus.* 7/8 in.; blackish brown; chest with yellow edges and spots; body with yellow bands; wings yellow.
3. *D. brunneus.* 3/4 in.; chest yellow, with black stripes; body rusty yellow; sides brown, with yellow edges.
4. *D. rufiventris.* 5/8 in.; chest blackish, with black stripes; body and legs yellow.
5. *D. Aeacus.* 5/8 in.; black; middle of body yellow; wings black.
6. *D. politus.* 7/16 in.; breast yellow, with brown stripes; body slate blue; point-half of wing brown.
7. *D. trifasciatus.* 7/16 in.; blackish; sides of chest whitish; body with three white bands.
8. *D. sexfasciatus.* 3/8 in.; chest white, hairy; body with six white and black bands.
9. *D. argenteus.* 5/16 in.; white; hairy, with yellow wings.
10. *D. guttula.* 1/4 in.; shiny black, with white spot on shoulder; clear wings.
11. *D. abdominalis.* 1/4 in.; chest gray, with brown stripes; body and legs yellow; wing blackish-brown.

CERATURGUS. Fox Fly.

1. *C. aurulentus.* 3/8 in.; golden yellow, with black stripes on chest; bands and triangular spots on body.

OMMATIUS. Weasel Fly.

Differs from Dasypogon in having a feathery hair at the point of feelers.

1. *O. tibialis.* 1/2 in.; blackish-brown; chest striped; bands on body and shanks white.

ASILUS. Robber Fly.

1. *A* (*Proctacanthus*) *longus.* 1½ in.; brown, with three stripes on chest; body gray; legs chestnut.
2. *A.* (*Proctacanthus*) *heros.* 1⅜ in.; reddish brown, with four stripes on chest; sides of body yellow; hairy; shank and feet rusty.
3. *A.* (*Proctacanthus*) *philadelphicus.* 1¼ in.; yellowish brown, with dark marks on chest and light triangular marks on body.
4. *A.* (*Trupanea*) *quadratus.* 1¼ in.; brown; body black; sides brown, white, hairy on edges of rings.

3.

5

6

5. *A.* (*Diogmites*) *umbrinus.* 1⅛ in.; light yellow and brown on chest; body rusty orange, with black spots on sides; legs stout.
6. *A.* (*Diogmites*) *ternatus.* 1 in.; gold yellow; light around black marks on chest and on edges of rings.
7. *A.* (*Proctacanthus*) *brevipennis.* 1 in.; reddish gray; chest with a broad black and indistinct side stripes; legs chestnut; shanks black.

8. *A.* (*Promachus*) *bastardii.* 7/8 in.; gray, with brown marks on chest and brown bands on body.
9. *A. niger*; 7/8 in.; black; chest with gray stripes.
10. *A.* (*Trupanea*) *vertebratus.* 7/8 in.; gray; chest with brown stripes; body with black spots; shanks reddish.
11. *A. rufipes.* 7/8 in.; brown; body yellowish, with short black bands; shanks reddish.
12. *A. macrolabis.* 7/8 in.; blackish, with gray stripes and four triangular white spots on body; legs chestnut.
13. *A.* (*Erax*) *pogonias.* 7/8 in.; brown, with indistinct chestnut stripes; legs black; shanks chestnut.
14. *A. sericeus.* 3/4 in.; golden; chest with a broad black stripe and indistinct narrow side stripes; wing brownish yellow.

8.

14.

16.

15. *A.* (*Mallophora*) *orcinus.* 3/4 in.; black, hairy; waist yellow.
16. *A.* (*Erax*) *aestuans.* 3/4 in.; reddish brown; chest with faint black lines; body black marked; a white ring around end of body on the male.
17. *A.* (*Erax*) *apicalis.* 5/8 in.; chest brassy yellow, with black stripes; body black, with triangular gray-haired side-spots; legs reddish.
18. *A. gracilis.* 5/8 in.; gray; body, point and hind edge of wing brownish; feeler and legs yellow.
19. *A. notatus.* 1/2 in.; black; chest grayish; body with white bands.
20. *A. atrupanea laphroides.* 1/2 in.; gray, hairy with black shanks.

LAPHRIA. Murder Fly.

1. *L.* (*Dasyllis*) *tergissa.* 1 in.; black, with yellow hair; both ends of body and legs black.
2. *L. lasipes.* 7/8 in.; black, head, chest and legs yellowish; end half of body gold-yellow, hairy.
3. *L. saffrana.* 7/8 in.; chest black, edges and two stripes yellow; body orange; wings brown.
4. *L. dersata.* 3/4 in.; slate black; head and legs gray. hairy; veins of wing brown.
5. *L. georgina.* 3/4 in.; black; chest yellow, hairy, with a short black band; body, except first rings, chestnut.
6. *L. melanogaster.* 3/4 in.; slate black; head, chest and fore-legs yellow, hairy.
7. *L. sericea.* 3/4 in.; black, with yellow hair; hind shanks black.
8. *L. thoracica.* 5/8 in.; rough; black; chest sulphur yellow; wing brownish.
9. *L. pyrrhacra.* 1/2 in.; black; chest striped; body with a white spot on each side and end rings yellowish red.
10. *L. posticata.* 1/2 in.; black; chest and end of body yellow-hairy.
11. *L. flavicollis.* 1/2 in.; black; chest yellow, hairy.
12. *L. melanopogon.* 1/2 in.; black; head, legs and chest gray, hairy; body black.
13. *L.* (*Atomosia*) *macrocera.* 1/4 in.; black, with white bloom; edge of body and legs red.

LEPTOGASTER. Slim Fly.

1. *L. histrio.* ⅜ in.; chest reddish brown, with three black stripes; body brown, with white bands and yellow legs; hind legs with brown bands.

HYBOS. Hunchback Fly.

1. *H. thoracicus.* ¼ in.; brown, with yellow shanks: wing smoky, with brown edge spot.

Family 18. EMPIDÆ. *Dance Flies.* They dance and hunt in swarms on shady brooks, and feed on insects. Their grubs live on decaying vegetable matter.

RHAMPHOMYIA. Bill Fly.

1. *R. cilipes.* ¼ in.; gray, with four stripes on chest and white hairy hind shanks.
2. *R. americana.* ¼ in.; slate gray, with yellow legs.
3. *R. scolopacea.* $\frac{3}{16}$ in.; blackish gray; chest faintly striped; body silvery; legs brown.

HEMERODROMIA. Catch Fly.

1. *H. superstitiosa.* ⅛ in.; whitish, with broad black stripe on chest and body.

TACHYDROMIA. Race Fly.

1. *T. fenestrata.* ⅛ in.; black, with yellow legs and black stripe on shanks.

Family 19. ACROCERIDÆ. *Small-headed Humpback Flies.* Their larvæ are parasites in spiders or their cocoons, and live in their bellies.

ACROCERA. Tophorned Fly.

1. *A. fasciata.* ⅛ in.; black; body yellow, with three black bands; feeler on the top of the head.

Nemestrinidæ are very rare bee-like flies with long trunks.

Family 20. BOMBYLIADÆ. *Bee Flies. Hover Flies.* They feed on the honey of flowers, are very swift flyers, and stop suddenly in the air. Their larvæ lives as parasites on other insects.

ANTHRAX. Mourning Hover Fly.

1. *A. simson.* ⅝ in.; black; chest grayish red; body silver spotted; wing clear, with brown spots.
2. *A. pluto.* ½ in.; black; body with interrrupted white band; wing with black blotches at base and point.
3. *A. halcyon.* ½ in.; black, with yellow hair; wing brown, with a spot in the middle, the point and edge cells clear.
4. *A. tegminipennis.* ½ in.; black, with yellow hair; wing dark brown; legs reddish.
5. *A. oedipus.* $\frac{7}{16}$ in.; black; body with white spots; wing clear, with black blotches and spots.

6. *A. fulviana.* $\frac{7}{16}$ in.; black, with golden hair; wing blackish brown on front edge.
7. *A. alternata.* $\frac{7}{16}$ in.; black; gray hairy: body white banded; wing smoky, a light spot on front edge near shoulder.
8. *A. noctula.* $\frac{7}{16}$ in.; black; sides of chest and bands on body yellow; wing blackish brown, a spot near shoulder, hind edge and some spots in the middle clear.
9. *A. sinuosa.* $\frac{3}{8}$ in.; black; gray hairy; wings more than half black; legs yellow.
10. *A. fulvo-hirta.* $\frac{3}{8}$ in.; black; yellow hairy; sides of body rust yellow; wing half black; legs yellow hairy.
11. *A. celer.* $\frac{5}{16}$ in.; black; yellow hairy on sides of chest, body and tail-end: wing more than half black.
12. *A. analis.* $\frac{5}{16}$ in.; black, tail-end silvery; wing half black.
13. *A costata.* $\frac{5}{16}$ in.; black, with gray hair; body with white bands; wing with black edge and veins.
14. *A elongata.* $\frac{5}{16}$ in.; black, with yellow bands on body and yellow legs.
15. *A. lateralis.* $\frac{1}{4}$ in.; black: yellow hairy; yellow bands on body and brown front edge of wing.
16. *A. fascipennis.* $\frac{1}{4}$ in.; black; body with gray band; wing clear, with brown stripes; point clear.

SYSTROPUS.

1. *S. macer.* $\frac{1}{2}$ in.; black and orange.

BOMBYLIUS. Hover Fly. Bee Fly.

1.

1. *B. varius.* $\frac{7}{16}$ in.; yellow hairy; body white marked and two black spots on the sides of each ring; wing brownish.
2. *B. fratellus.* $\frac{3}{8}$ in.; yellow hairy; darker on back; wing half reddish black.
3. *B. aequalis.* $\frac{5}{16}$ in.; yellow, hairy; front half of the wing brownish.
4. *B. fulvus.* $\frac{1}{4}$ in.; black, with golden hair; wing clear, with gold yellow veins.
5. *B. atriceps.* $\frac{1}{4}$ in.; like *B. fratellus* in color, but darker.

2.

3.

Family 21. STRATIOMYIIDÆ. *Soldier Flies. Coat-of-arms-Flies.* So named from the resemblance of the body to a coat-of-arms. They feed on flowers in swamps near water. Their larvæ live in moist mould or water. They carry their wings, one covering the other, when at rest.

SARGUS. Flat Fly.

1. *S. decorus.* $\frac{3}{8}$ in.; green bronze, with yellow legs.
2. *S. viridis.* $\frac{1}{4}$ in.; bronze green or blue, with green legs.
3. *S. xanthopus.* $\frac{1}{4}$ in.; green gold, with yellow legs.
4. *S. pallipes.* $\frac{1}{4}$ in.; brownish black; back of body, belly and legs yellow.

NEMOTELUS. Swamp Fly.

1. *N. pallipes.* $\frac{3}{16}$ in.; black; body steel blue; legs yellow.

STRATIOMYS. Coat-of-Arms Fly.

1

1. *S. Meigenii.* $\frac{9}{16}$ in.; black; body on each side a triangular spot, and tail-end yellow.
2. *S. norma.* ½ in.; black, with chestnut stripe on chest part: body with yellow spot and streaks; legs yellow.
3. *S. intermedia.* ⅜ in.; black; yellow hairy; body with a yellow spot on each side and yellow edges.

4

4. *S. virgo.* ⅜ in.; black; body green, with black stripe; legs yellow.
5. *S. picipes.* ⅜ in.; black; body with four white spots.
6. *S. vertebrata.* ¼ in.; black; body whitish, with a black stripe; legs yellow.

5

Family 22. SYRPHIDÆ. *Humming Flies. Drone Flies* They feed on the honey of flowers. *Syrphus* are the most valuable plant lice destroyers, laying their eggs among the plant lice nests. *Voluccella* is parasitic on bumblebees. Others live in ants' nests or rotten wood. *Eristalis* lives in the water. Many of the flies closely resemble bees, bumblebees or wasps.

PSARUS. Humming Fly.

1

1. *P. ornatus.* ⅜ in.; black; chest with two yellow stripes: body with eight yellow bands.
2. *P. quadrifasciatus.* ½ in.; black, chest with four yellow spots; body with four yellow bands.

MICROCODON. Bee Fly.

1. *M. globosus.* ½ in.; brown; hairy. Has a curious beetle-shaped pupa.

MELANOSTOMA.

1 *M. mellinum.* ⅜ in.; black and orange; chest hairy.

XYLOTA. Saw Fly.

1. *X. hæmatodes.* ½ in.; black; body red; wings blackish.
2. *X. ejuncida.* $\frac{7}{16}$ in.; dark green; body with four yellow spots.
3. *X. quadrata.* ⅜ in.; black, body with four square yellow spots.
4. *X. metallica.* ⅜ in.; chest green bronze; body black, with four large square spots.
5. *X. proxima.* $\frac{5}{16}$ in.; black; body with unequal yellow spots and a red spot on hind shanks.

MILESIA. Mould Fly.

1. *M. virginiensis.* 1 in.; gold yellow, with black bands; wing smoky black.
2. *M. ornata.* ¾ in.; black; chest and body with three broken yellow bands each. The last band entire.
3. *M. notata.* ½ in.; black; body with two spots; knees rust yellow.
4. *M. acuta.* Dark blue; chest and spots on body gold hairy.

RHINGIA. Nose Fly.

1. *R. nasica.* ⅜ in.; chest gray, with white stripes: body yellow, with black stripe.

CHRYSOGASTER.

1. *Ch. nitidus.* ¼ in.; green bronze; chest with four coppery stripes; body with black stripes and bands; wing brown, streaky.

SYRPHUS. Hover Fly.

1

5

8

1. *S. ribesii.* ½ in.; The raspberry fly. Black and yellow.
2. *S. lesueri.* ½ in.; like last, but no mark on second ring of body; tail-end black.
3. *S. corvus.* ½ in.; like last, but a dark orange shade on middle of body; lighter at sides, and one black ring more.
4. *S. abreviatus.* ½ in.; like last, but body very short, and no light mark between chest and body.
5. *S. lapponicus.* ½ in.; black and yellow; wing brown on front edge.
6. *S. americanus.* ⅜ in.; chest bronze green; body black, with broad yellow bands; legs rusty; wing yellowish.
7. *S. concavus.* ⅜ in.; like last, but chest less bright and wing not yellow.
8. *S. obscurus.* ⅜ in.; dark green bronze; body with triangular coppery spots.
9. *S. politus.* ⅜ in.; chest olive, with yellow edge and whitish middle stripe; body black, with bands and square spots.
10. *S. diversipes.* ⅜ in.; chest black, with yellow hairs; body black, with yellow bands.
11. *S. (Platychirus) hyperboreus.* $\frac{5}{16}$ in.; like the next, but brown woolly.
12. *S. (Platychirus) quadratus.* $\frac{5}{16}$ in.; shiny bronze green; body with yellow spots.

9

10

12

13. *S.* (*Sphaerophoria*) *cylindricus.* $\frac{5}{16}$ in.; chest metallic olive green; body rust yellow; first ring black.
14. *S. obliquus.* ¼ in.; chest metallic green; body black, with two yellow bands and eight stripes.
15. *S. geminatus.* ¼ in.; chest black, with yellow sides; body black, with yellow bands, double spots and stripes; legs yellow.
16. *S. marginatus.* $\frac{3}{16}$ in.; chest black, with yellow sides; body black, with yellow bands, spots, streaks and edges; legs yellow.

13.

14.

TRIODONTA. (POLYDONTA.) (MERODON.) Shanks Fly.

1. *T. curvipes.* ½ in.; black, with yellow hair; body reddish, with a black triangle above; hind shanks thickened.
2. *T.* (*Merodon*) *bardus.* ¾ in.; shaped like *curvipes*; chest, first ring and sides of body covered with yellow hairs.

SERICOMYIA.

1.

2

1. *S. chrysotoxoides.* ½ in.; black, with yellowish hair on chest, and whitish marks on body.
2. *S. militaris.* ½ in.; white and black.

1.

2.

3.

4.

ERISTALIS. *Mud Fly.*

1. *E. tenax.* 5/8 in.; bronze brown, with yellow hair around chest; two spots and one band on body; wing clear.
2. *E. flavipes.* 5/8 in.; black, and strongly yellow-haired; no spots on body, but the first ring yellow hairy.
3. *E. bastardi.* 9/16 in.; black; gray hairy; four orange spots on body.
4. *E. saxorum.* 1/2 in.; shiny black; body with steel blue bands and yellow rings; wing blackish brown.
5. *E. dimidiatus.* 1/2 in.; metallic black, with gray hair; body with yellow spots; leg joints white.
6. *E. transversus.* 7/16 in.; black; chest yellow hairy; body with yellow spots.
7. *E. æneus.* 7/16 in.; bronze brown; gray haired; marks indistinct.
8. *E. (Mallota) posticatus.* 7/16 in.; chest yellow hairy; body black; yellow at first ring and thickened hind shanks.
9. *E. cuprovittatus.* 3/8 in; bronze green; chest with coppery stripes; joints of shanks yellow.
10. *E. chrysostomus.* 3/8 in.: chest black, with four yellow stripes; body rusty yellow, with white double spots; first ring black.
11. *E. brousi.* 3/8 in.; chest brown hairy; body orange and black.

5.

6.

7.

8.

11.

VOLUCELLA.

1. *V. evecta.* 5/8 in.; black, with yellow hair.

HELOPHILUS.

1. *H. latifrons.* 5/8 in.; chest gray yellow, hairy, with three black stripes; body black and orange.
2. *H. similis.* 1/2 in.; like the last, but smaller.

SYRITTA.

1. *S. pipiens.* 5/16 in.; shiny black, with white spots.

CRIORHINA.

1. *C. verbosa.* 3/4 in.; yellowish gray and black hairy; end of chest whitish.

MESOGRAPTA.

1. *M. marginata.* 1/4 in.; orange and black, like a small *S. diversipes.*

SOMULA.

1. *S. decora.* 5/8 in.; chest shiny black; body black and yellow; legs yellow; toes black.

SPILOMYIA.

1. *S. fusca.* 3/4 in.; dark brown; whitish marks on chest; tail-end gray hairy; legs black and yellow.
2. *S. quadrifasciata.* 5/8 in.; chest black and yellow; body gray, black and yellow; legs yellow and dark brown; wing half brown.
3. *S. longicornis.* 1/2 in.; brown and yellow: legs yellow; fore feet black; wing light brown and clear.

TEMNOSTOMA.

1. *T. bombylans.* 1/2 in.; black, yellow and gray.

Family 23. CONOPIDÆ. *Big-headed Flies.* Much resembling wasps in shape. Their larvæ live and transform in the bodies of humble-bees.

CONOPS. Bighead.

2.

1. *C. excisa.* 5/8 in.; black; two gold spots on chest and on joints of body; wing half black, half clear.
2. *C. nigricornis.* 1/2 in.; black; sides of body yellow marked; shank yellowish, with a black band; wing broadly brown.
3. *C. sagittarius.* 1/2 in.; black and white.
4. *C. marginata.* 7/16 in.; black; a broken band on chest, and sides of body yellow.

3.

LODION. Sucking Fly.

1. *L. fulvifrons.* 1/4 in.; gray, with two black stripes on chest, and black double spots on body.
2. *L. abdominale.* 1/4 in.; chest dark gray; body, front and legs brick red.

MYOPA. Bladderhead.

1. *M. stylata*; 3/8 in.; chest blackish; body with black and yellow bands; hind shanks yellow, with two black bands.
2. *M. vesiculosa.* 3/8 in.; reddish brown; wing brown, whitish near shoulder.
3. *M. longicornis.* 3/16 in.; blackish, body white spotted on each side; legs yellow.

Family 24. SCENOPINIDÆ. *Window Flies.* Small black flies, without bristles. They are named from being often found on the windows. Their body is flat, and their wings overlap each other when at rest.

SCENOPINUS. Window Fly.

1. *S. pallipes.* ¼ in.; metallic brown, with yellow legs and brown wings.

Family 25. LONCHOPTERIDÆ. *Spear-winged Flies.* Small brownish or yellowish flies; live on grasses in moist places. Wings cover each other when at rest.

LONCHOPTERA. Spear-winged Fly.

Family 26. PIPUNCULIDÆ. *Big-eyed Flies.* Small flies, sometimes found on flowers; their heads are all eyes.

PIPUNCULUS. Big-Eyed Fly.

Family 27. PLATYPEZIDÆ. *Flat-footed Flies.* Like small house flies, but the upper joints of their feet are widened and flat. They are found hovering in the air or running swiftly over leaves.

PLATYPEZA. Flat-footed Fly.

Family **28. DOLICHOPODIDÆ** *Long-legged Flies.* Mostly bright metallic green; found in swamps on water plants. They prey on other insects; their larvæ live in decaying vegetable matter.

DOLICHOPUS. Long-legged Fly.

3

1. *D. cuprinus.* ¼ in.; chest bronze green, with coppery stripes; legs yellow; feet black.

15

2. *D. brevipennis.* ¼ in.; metallic green; legs yellow; feeler, half of hind shanks and feet black.
3. *D. gratus.* ¼ in.: blue green; feet black; shins and face yellow.

20

4. *D. laticornis.* $\frac{3}{16}$ in.; green; feet black; shins yellow; face white.

22

5. *D. setifer.* $\frac{3}{16}$ in.; dark green; feet black; shins yellow; face white; hind feet thorny.
6. *D. pachycnemus.* ¼ in.; green; feet yellow; hind feet black.

24

7. *D. splendidus.* ¼ in.; green with red reflex; fore legs yellow; hind feet black.
8. *D. eudactylus.* ¼ in.: green; fore legs yellow; hind feet black and yellow.

25

9. *D. variabilis.* $\frac{3}{16}$ in.; green; face white; feeler red; feet yellow.
10. *D. longipennis.* ¼ in.: green; middle and side stripes of chest brassy yellow, feeler red; feet yellow: face yellowish white.

28

11. *D. fulvipes.* ¼ in.; green; face golden; feeler, fore legs, and hind feet dark yellow.

31

12. *D. scoparius.* ¼ in.; green; face white; feeler black; feet yellow.
13. *D. discifer.* ¼ in.; like last; but tip of fore feet black.

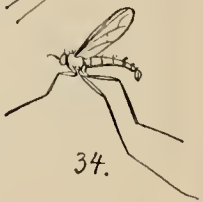
32

14. *D. setosus.* ¼ in.: like last; feet black and studded with long bristles.
15. *Gymnopternus barbatulus.* ⅛ in.; dark green; feet black; face bearded.

23

26.

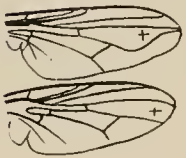
30.


34.

16. *G. spectabilis.* $\frac{3}{16}$ in.; chest violet; feeler black; feet yellow.
17. *G. albiceps.* $\frac{3}{16}$ in.; like last; but feeler red.
18. *G. nigribarbus.* $\frac{1}{8}$ in.; bronze black; face bearded.
19. *G. debilis.* $\frac{1}{8}$ in.; green; face gray; feeler red; legs yellow.
20. *Pelastoneurus longicauda.* $\frac{3}{16}$ in.; bronze black; five white spots on chest part, above.
21. *P. cognatus.* $\frac{1}{8}$ dark bronze; feeler red.
22. *Tachytrechus mocchus.* $\frac{1}{4}$ in.; bronze green; feeler yellow.
23. *Diostracus prasinus.* $\frac{1}{4}$ in.; pale green; body black; feet yellow.
24. *Argyra calcitrans.* $\frac{1}{8}$ in.; black; face white; legs pale yellow.
25. *Synarthrus barbatus.* $\frac{1}{8}$ in.; green; feet yellow; hind shanks green.
26. *Porphyrops melampus.* $\frac{3}{16}$ in.; metallic green; feet black; hairy.
27. *P. (longipes) nigricoxa.* $\frac{1}{4}$ in.; like last; feet yellow.
28. *Diaphorus opacus.* $\frac{1}{8}$ in.; entirely black.
29. *D. sodalis.* $\frac{3}{16}$ in.; bronze green; thighs black; feet yellow.
30. *Lianculus genualis.* $\frac{5}{16}$ in.; greenish; four black lines on chest, and bands on body; a white-eyed black spot on tip of wing.
31. *Scellus exustus.* $\frac{1}{4}$ in.; black; body copper color; sides green; wing black.
32. *Hydrophorus pirata.* $\frac{1}{4}$ in.; bronze brown; body and legs green; wing gray.
33. *Psilopus patibulatus.* $\frac{1}{4}$ in.; dark green or steel-blue; wings with two black bands; face hairy; feet black.
34. *P. filipes.* $\frac{1}{4}$ in.; slender and long-legged; head and chest steel-blue; body green; feeler and legs yellow.
35. *P. caudatulus.* $\frac{3}{16}$ in.; green gold; body edge with black spots; shanks yellow.
36. *P. guttula.* $\frac{1}{4}$ in.; bronze green; wing black at point; drops and hind edge clear.
37. *P. sipho.* $\frac{1}{4}$ in.; bright green; wings with two short bands; legs yellow.
38. *P. palleus.* $\frac{1}{4}$ in.; light green; body with coppery black spots.

Family 29. MUSCIDÆ. *Typical Flies.* This family is very numerous, and embraces about two-thirds of the whole order. It needs, therefore, a separate key.

KEY TO THE MUSCIDÆ.



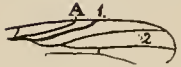
SUB-FAMILY I. Upper cell of wing ending near point, closed or nearly so.

Bristle at end of feeler, — smooth and bare - - - - - - - - - - - *Tachinidæ.*
one side bare, the other comb-like - - - - - *Muscidæ (Stomoxys.)*
feathery at foot, bare at point - - - - - - - - *Sacrophaga.*
feather-like to the end body bristly - - - - - - - - - *Dexia.*
body bristly only at last rings - - - - - - - - - - *Musca.*

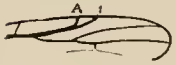
SUB-FAMILY II. Upper cell wide open.

A scale covering the balancers in place of hind-wing and a seam across the breast-part *Anthomyia and Hylemia*
The scale very small or entirely wanting; the seam across breast-part incomplete or wanting.

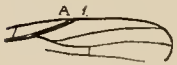
Here belong many families of small flies. The veinings of their wings lie between *Anthomyia* and *Phora*. The scientific divisions are made on small characters, and are often very difficult to recognize in such delicate objects. A is called the auxiliary vein; 1 is called the first length-vein from which the forked second length-vein branches.



Wing similar to *Anthomyia*.
Vein A and 1 separate - - - - - - - - *Scatophaga, Sciomysa, Trypeta, Tetanocera, Sepedon, Dryomyza, Pyrgota,* and *Ortalis.*



Vein A and 1, but separating near the front edge - - *Psila, Loxocera, Calobata* and *Micropeza.*
Vein A close to 1, cells large - - - - - - - - - - *Helomyza* and *Sepsis.*
cells small - - - - - - - - - - *Lonchæa* and *Sapromyza.*



Wing less complete than *Anthomyia*.
Vein A close to 1, only one cell - - - - - - - - - - *Sphærocephala.*
Vein A and 1 grown together - - - - - - - - - - *Piophila* and *Agromyza.*
separate near shoulder - - - - - - - - - *Ephydrinidæ.*
Vein A only a stump - - - - - - - - - - - *Drosophila.*
Vein A entirely wanting - - - - - - - - - - *Oscinis* and *Chlorops.*
Wing with a few stout veins near front-edge, and a few weak, unconnected ones in hind-edge - - *Phora.*

TACHINIDÆ. *Swift Flies.* These flies are parasitic on other insects, particularly on caterpillars, on which they lay their eggs. Their larvæ live and transform within the bodies of the caterpillars and thereby destroy the latter.

TRICHOPODA. Eyebrow Fly.

1. *T. formosa.* $\frac{5}{8}$ in : chest black with white stripes; body red; wing black with white stripes.
2. *T. lanipes* $\frac{7}{16}$ in.; black with white lines on chest; wing black, hind edge clear.
3. *T. pennipes.* $\frac{1}{4}$ in.; chest gold with black stripes; body rust yellow; hind legs feathered.
4. *T. cilipes.* $\frac{1}{4}$ in.: blackish brown; body reddish; wings lined; hind legs feathered.
5. *T. hirtipes.* $\frac{1}{4}$ in.; black; first rings of body reddish; wing clear edged.
6. *T. plumipes.* $\frac{1}{4}$ in.: black; hind edge of wing white; hind legs feathered.

5.

TACHINA. Swift Fly.

1.

4.

3.

1. *T.* (*Jurinia*) *hystrix.* $\frac{1}{2}$ in.: blue black; body dark chestnut; head with yellow hair; wing light brown: scales brownish.
2. *T.* (*Jurinia*) *algens.* $\frac{1}{2}$ in.: chest greenish blue black; body deep black: eyes red brown; head and shoulder brassy yellow; scales white.
3. *T.* (*Hystricia*) *vivida.* $\frac{1}{2}$ in.; chest gray with black stripes; body light red with black spots and hair; legs light red.
4. *T. abrupta.* $\frac{7}{16}$ in.; chest gray with dark stripes; body orange, with a blackish dotted stripe; legs black.
5. *T. disjuncta.* $\frac{3}{8}$ in.; chest gray with black lines; body black and white banded.
6. *T.* (*Senometopia*) *militaris* or *Nemoræa lucaniæ.* Their larvæ feed on the army worm and destroy it.
7. *T.* (*Lydella*) *doryphoræ.* Their larvæ feed on the potato beetle.

6.

7.

TACHINA. Swift Fly. —Continued.

Cassidomyia. Preys on the helmet beetle.
Hyalomyia. Preys on leaf beetles.
Ocyptera. Feeds on bugs.
Chartophila floralis. Preys on wasps' nests.

IDIA. Mouth Fly.

1. *I. viridis.* ¼ in.; bronze green, with black legs.

MUSCIDÆ. *Common Flies.* Their larvæ live in decaying meat, sores, decaying vegetable or animal matter, manure, etc.

STOMOXYS. Stinging or Stable Fly.

1. *S. parasita.* $\frac{5}{16}$ in.; gray, blackish brown above; red spots on first rings of body; feeler strongly comb-like.
2. *S. calcitrans.* $\frac{5}{16}$ in.; gray, with black stripes on chest, and a band and four black spots on body; feeler hair feathery on one side. Both have long snouts.

2.

SARCOPHAGA. Flesh Fly.

The eggs of this fly hatch within the female, and it deposits the living young maggots on dead animals, meat, etc.

1. *S. georgina.* ½ in.; blue gray, with black stripes on chest; body white, gray and black chequered; legs black; tail-end reddish.
2. *S. carnaria.* ½ in.; like last, but tail-end black. The males of both are much smaller: about ⅜ in.

2

DEXIA. Cone Fly.

1. *D. vertebrata.* ½ in.; chest gray and black; body orange and black; wing smoky.
2. *D. dives.* $\frac{7}{16}$ in.; black; chest with three yellow stripes; body with yellow bands; wing yellow near shoulder; end of veins blackish brown.

MUSCA. House Fly.

2.

5.

8.

10.

1. *M. gulo.* $\frac{5}{8}$ in.; black; chest with four gray stripes; tail-end gray.
2. *M.* (*Calliphora*) *vomitoria.* Blue Bottle or Blow Fly; ½ in.; chest grayish black; body steel blue; legs black; eyes coppery.
3. *M. stygia.* $\frac{7}{16}$ in.; chest dark slate gray; body olive bronze and yellow, chequered; legs rust yellow.
4. *M.* (*Lucilia*) *cæruleiviridis.* $\frac{7}{16}$ in.; dark bluish green; legs black.
5. *M.* (*Calliphora*) *cadaverinum.* $\frac{7}{16}$ in.; dark steel blue; eyes and legs black.
6. *M.* (*Lucilia*) *cæsar.* Green Bottle Fly. $\frac{3}{8}$ in.; brilliant metallic green; legs black.
7. *M. domestica.* $\frac{5}{16}$ in.; chest grayish black; body horn color, with a broken black middle stripe.
8. *M. harpyia.* $\frac{5}{16}$ in.; chest gray, with dark stripes; body black, with horny spots on the edge.
9. *M.* (*Campsomyia*) *macellaria.* Screw-worm Fly. $\frac{5}{16}$ in.; bright metallic green, with four black stripes on chest.
10. *M.* (*Hæmatobia*) *serrata.* Horn Fly. $\frac{3}{16}$ in.; grayish black.

ANTHOMYIDÆ. *Flower Flies.* They are mostly found on flowers. Their larvæ live on roots or decaying vegetable matter.

ANTHOMYIA. Flower Fly.

1. *A. raphani.* The Radish Fly. ¼ in.; ash gray; a brown spot on forehead and faint brown lines on chest; a black stripe on body, and narrow black lines on edge of rings.
2. *A. (Phorbia) ceparum.* The Onion Fly. ¼ in.; ash gray, with black hair; a rusty forked spot on forehead and three rusty lines on chest; wings yellowish near shoulder.
3. *A. cunicularis.* ¼ in.; dark gray, with copper-colored eyes, edged by a white line, and a large, yellowish, semi-transparent spot on both sides of each of the first three rings of the body.
4. *A. (Homalomyia) scalaris.* ¼ in.; grayish black; copper-colored eyes, edged by a white line.
5. *A. (Phorbia) brassicæ.* The Cabbage Fly. ¼ in. Feeds on the roots of cabbage, turnip, radish and cauliflower.
6. *A. zeæ.* Corn Fly. Their larvæ eat the kernel of the corn.
7. *A. (Pegomyia) vicina.* Beet Fly. Their larvæ mine the leaves of the beet.
8. *A. æneseens.* $\frac{3}{16}$ in.; greenish black, with white edge around the eyes and brownish yellow wings.

2.

3.

4.

SEPSIS. Fence Fly.

1. *S. minuta.* ⅛ in.; black; feeler brown; legs yellow.

SCATOPHAGA. Manure Fly.

1. *S. furcata.* ½ in.; yellowish, hairy.
2. *S. squalida.* ⅜ in.; gray brown; face reddish; hairy.
3. *S. exotica.* ¼ in.; gray; chest with three brown stripes; body checkered; shanks reddish.

TRYPETA. Boring Fly.

Small flies, with black and white wings, whose larvæ live in the stems or in the fruits of plants.

1. *T. comma.* ¼ in.; reddish; yellow hairy; wing blackish with a clear triangular spot enclosing a black comma.

2. *T. sparsa.* ¼ in.; chest and body gray; wing black.

3. *T. cutta.* ¼ in.; yellow, with yellow wings, clear at edge, and black eye-spots.

4. *T.* (*Camptoneura*) *picta.* ¼ in.; chest chestnut, with a black stripe: wing blackish brown, with two white drops and three scallops on the edge.

5. *T. longipennis.* ¼ in.; yellow, with four black dots near joint of body and chest; wing brownish, yellow banded; wing longer than body.

6. *T. fratria.* $\frac{3}{16}$ in.; dark yellow; wings with brownish wavy bands: wing as long as body.

7. *T. suavis.* $\frac{3}{16}$ in.; pale yellow; wing transparent, with black bands.

8. *T. polita.* ¼ in.; deep black; head and legs yellow; wing whitish transparent with brown bands.

9. *T. rotundipennis.* $\frac{5}{16}$ in.; brown; wing black, with white dots.

10. *T. solidaginis.* ¼ in.; reddish brown; head and legs yellow; wing marked with red; larvæ forms rounded bulbs in the stems of the golden rod.

11. *T. seriata.* ¼ in.; entirely yellow; wing with black edges and dots.

12. *T. bella.* ⅛ in.; grayish; legs and body yellow; wing black, with transparent spots. Found on Ambrosia.

13. *T. asteris.* $\frac{3}{16}$ in.; yellowish brown: legs pale; wing with three irregular brown bands. Produces swellings on asters.

14. *T. pomonella.* $\frac{3}{16}$ in.; head brown; chest black with two gray stripes; end of chest white; body grayish black. An apple worm.

SAPROMYZA. Dirt Fly.

1. *S. resinosa.* ⅛ in.; honey yellow; wings yellowish, like varnish.

ORTALIS. Gay-colored Fly.

1. *O. flexa.* ¼ in.; red brown; wing with three transparent bands. The maggot feeds in onions.
2. *O. ænea.* ¼ in.; bronze green, with red front; wing with three brown bands.
3. *O. notata.* $\frac{3}{16}$ in.; dark bronze green; a yellow band near tail-end, and a triangular spot on point of wing.

LONCHÆA. Long Fly.

Raises blisters on the stems of the willow.

LOXOCERA. Long-horned Fly.

1. *L. cylindrica.* ¼ in.; rusty yellow, with a brown stripe on chest and point of wing.

CALOBATA. Long-legged Fly.

1. *C. antennipes.* ⅜ in.; black, with yellow legs; the fore legs and joints of hind legs white; hind shanks with two brown bands.

MICROPEZA. Small-footed Fly.

1. *M. pallipes.* ¼ in.; black; mouth and legs yellowish.

SPHÆRACEPHALA. Perspective Fly.

1. *S. brevicornis.* ¼ in.; black, with rusty yellow legs; wing with a brown band and point; eyes stalked.

PYRGOTA. Cone Fly.

1. *P. undata.* ½ in.; yellow rusty brown; a faint cross-mark on chest; a clear spot on front edge of wing; hind edge of wing with clear scallops.

SEPEDON.

1. *S. fuscipennis.* ¼ in.; chest blue black; body and legs chestnut red; feet black; wing clouded.

SCIOMYZA.

1. *S. obtusa.* ¼ in.; grayish brown; wing clouded; veins blackish.

TETANOCERA. Damp Fly.

1. *T. plumosa.* ⅜ in.; head reddish gold; chest pale grayish brown; body yellowish shaded and marked dark brown.
2. *T. clara.* $\frac{5}{16}$ in.; pale yellow; face white; chest with two brown stripes; wings tawny, brown clouded.
3. *T. arcuata.* $\frac{5}{16}$ in.; yellowish brown; chest with brown dots; wing with large brown spots.

4. *T. saratogensis.* ¼ in.; yellow; eyes black; chest with two faint stripes; wing gray, brown banded, front edge black.
5. *T. pictipes.* ¼ in.; like last, but pale gray, and legs banded.
6. *T. combinata.* ¼ in.; reddish brown; wing with two double bands of dark spots.

PSILIDÆ are small orange and black flies, about ¼ inch in length.

DRYOMYZA.

1. *D. simplex.* $\frac{5}{16}$ in.; polished yellow; wing tinged.

AGROMYZA. Field Fly.

1. *A. tritici.* Wheat Moss Fly. $\frac{1}{12}$ in.; black.

HYLEMIA.

1. *H. deceptiva.* ¼ in.; The Sham Wheat Fly. Ash gray, with black legs; chest with three and body with one spotted stripe; front tawny yellow.

OSCINIS.

1. *O. tibialis.* ½ in.; black, legs yellow; hind shanks banded.

HELOMYZA. Saw Fly.

1. *H. quinque punctata.* ¼ in.; yellowish brown; body rust yellow, black side spots; wing five spotted.

CHLOROPS. Green-eyed Fly.

1. *C. vulgaris.* $\frac{3}{16}$ in.; pale tawny yellow; a black spot on head; feeler black.
2. *C. antennalis.* Like last, with pale variations; feeler yellow.

PIOPHILA. Cheese Maggot Fly.

1. *P. casei.* ⅛ in.; glossy black; middle and hind legs yellowish. Their maggots are the well-known skippers in old cheese.

EPHYDRINIDÆ. Salt Water Fly.

Small flies found near the salt water, in which their larvæ live.

1. *Dichæta caudata.* $\frac{3}{16}$ in.; black, with ten long bristles in tail.
2. *D. brevicauda.* ⅛ in.; black, with six long bristles in tail.

Notiphila bella. ⅛ in.; gray, with brown stripes.

Psilopa atra. ⅛ in.; glossy black; hind feet red.

Discocerina parva. $\frac{1}{16}$ in.; ashy gray; body black; wing transparent; feeler, knees and feet yellow.

Hydrellina hypoleuca. ⅛ in.; brassy brown; face and under side white; legs black; hind feet red.

Brachydeutera dimidiata. ⅛ in.; brown; under side white.

Parydra bituberculata. $\frac{3}{16}$ in.; brassy brown; wing gray, with black border; two warts on hind part of chest.

Ephydra atro-virens. $\frac{3}{16}$ in.; dark green.

Scatella favillacea. ⅛ in.; ashy gray; wing with four clear spots.

OCHTERA. Catch Fly.

1. *O. tuberculata.* $\frac{3}{16}$ in.; black, with swollen shanks; feet red.

O. empidiformis. ⅛ in.; whitish; body black; head gray, with black eyes.

DROSOPHILA. Apple Fly.

1. *D. ampelophila.* ⅛ in. Pomace or Wine Fly. Yellowish. Found about wine or cider vats, and live on decaying fruit.

PHORIDÆ. *Hump-backed Flies.*

Phora. Minute flies, found sometimes on windows, sometimes flying and dancing in swarms.

Family 30. ŒSTRIDÆ. *Gad or Bot Flies.* Large bee-like flies with very small mouths; parasitic on animals.

ŒSTRUS. Bot Fly.

1. *Œ. ovis.* Sheep Bot Fly. ½ in.; brown, smooth; body checkered. Lays its eggs in the nostrils of sheep; from there the maggots, when hatched, crcep up the passages of the nose and fasten themselves in the chambers of the forehead.
2. *Œ. phobifer.* ½ in.; black; chest and tail-end reddish; wing black banded.

GASTROPHILUS. Horse Bot Fly.

1. *G. equi.* ½ in.; pale yellow, spotted with red; chest banded with black; wing spotted. It lays its eggs on the knees of horses; the hatched maggots irritate the horse, which licks the infested spot and gets the maggots into his mouth, and from there they crawl into his stomach where they fasten themselves and stay until full grown, passing out with the excreta.
2. *G. hæmorrhoidalis.* ¼ in.; red tail. Lays its eggs on the lips of the horse.
3. *G. veterinus.* The Farrier Bot Fly. ⅜ in.; brown. Lays its eggs under the throat of the horse.

HYPODERMA. Warble Fly.

1. *H. bovis.* ½ in.; black; face pale gray and yellow; chest with a yellow and white band; body with a yellow, black and reddish band. It lays its eggs on the backs of cattle. The maggots bore through the skin and produce tumors in which they live till full grown and then crawl out.
2. *H. lineata.* ½ in.; black, covered with gray hair; black hairy on middle of body; tail-end yellow; chest with indistinct stripes; legs reddish yellow. Habits like the last.

CUTEREBRA. Skin-boring Fly.

1. *C. cuniculi.* 1 ⅛ in.; black; sides and hind portion of chest yellow hairy. Lives on rabbits.
2. *C. horripilum.* 1 in.; chest and first rings yellow hairy.
3. *C. americana.* ⅞ in.; black; sides of chest yellow with three black dots.
4. *C. buccata.* ⅞ in.; gray; body steel-blue; head and sides with black dots. Lives on squirrels.

III. SUB-ORDER PUPIPARA.

LOUSE FLIES AND TICKS.

Family 31. HIPPOBOSCIDÆ. *Louse Flies and Ticks.* This and the next two families differ from all flies mentioned before by having no larva state. The female instead of laying eggs, gives birth to the pupa from which the insect emerges.

1

2

HIPPOBOSCA. Louse Fly. Forest Fly.

With five veins in their wings.

1. *H. equina.* ¼ in.; bright rust yellow; chest chestnut; feet black. Nestles in the hair of the horse.
2. *H. bubonis.* ⅜ in.; horn color with reddish tinge and black hairs; feet and tail-end black. Lives on the owl.

LIPOPTENA. Deer Tick.

Lives in his wingless state on the deer, and with developed wings on the partridge. With three length-veins in the wing. *L. cervi* on the deer; *Ornithomyia pallida* on the partridge.

ORNITHOMYIA. Bird Louse Fly.

1. *O. nebulosa.* $\frac{3}{10}$ in.; yellow head; chest reddish brown with yellow spot on shoulder, and three stripes; body pale brown with black hair.
2. *O. pallida.* $\frac{1}{5}$ in.; chest pale yellow; body pale brown; legs white on partridge.
3. *O. confluens.* ⅛ in.; reddish brown.
4. *O. fusciventris.* $\frac{3}{16}$ in.; chest honey yellow; body brown; legs green.

OLFERSIA. Sucking Fly.

1. *O. americana.* ¼ in.; to point of wing, $\frac{7}{16}$ in.; clay yellow, with impressed middle line on chest. Lives on owls and other birds.

MELOPHAGA. Mammal Fly.

Wingless.

1. *M. depressa.* ⅛ in.; honey yellow, with oval eyes.
2. *M. ovina.* The Sheep Tick.

Family 32. NYCTERIBIIDÆ. *Bat Lice.* Leather yellow; about ⅛ inch in length.

Family 33. BRAULIDÆ. *Bee Lice.*

BRAULA. Bee Louse.

1. *B. cæca.* $\frac{1}{16}$ in.; wingless and eyeless. Lives on the honey bee.

Family 34. PULICIDÆ. *Fleas.*

PULEX. Flea.

1. *P. irritans.* The human Flea. Dark brown; no spines on mouth or back of neck.
2. *P. (Ceratopsyllus) serraticeps.* The Dog Flea. Reddish tawny brown; a row of black spines on sides of mouth and back of neck. Other fleas occur on different birds and animals.

FOR THE COLLECTOR.

Flies are caught in a common butterfly net made of mosquito netting; a slight pressure between the fingers ills them. A pin run through the chest part makes them ready for the cabinet. The larger ones may be retched like butterflies. The craneflies require delicate handling or their legs will come off. Small flies may e gummed on a piece of card, and this pinned in the cabinet, though I prefer to dry them between white paper ith a slight pressure as in a book. Afterwards arrange and name them on a sheet of heavy white paper and en lay a plate of glass of the same size over it and paste it securely around the edges.

The drawings in this book are mostly life-size, the small kinds being drawn double life-size.

KNOBEL'S ILLUSTRATED GUIDE BOOKS

TO FACILITATE THE STUDY OF NATURAL HISTORY OF THE NORTH.

1. *A GUIDE TO FIND THE TREES AND SHRUBS OF NEW ENGLAND.*
2. *THE FERNS AND EVERGREENS OF NEW ENGLAND.*
3. *THE DAY BUTTERFLIES AND DUSKFLYERS.*
4. *BEETLES OF NEW ENGLAND AND THEIR KIND.*
5. *THE NIGHT MOTHS OF NEW ENGLAND.*
6. *FRESH-WATER FISHES OF NEW ENGLAND.*
7. *THE TURTLES, SNAKES, FROGS, AND OTHER REPTILES.*
8. *THE MOSQUITOES AND FLIES OF THE NORTH.*

(*Several others in preparation.*)

BIOLOGICAL LABORATORY WOODS HOLE LIBRARY

Each, oblong, paper, net 50 cents. Cloth, net 75 cents.

SOME EXTRA GOOD BOOKS.

"EVERY BIRD." By Reginald Heber Howe, Jr. Fully Illustrated.	$ 1.00
THE GAME BIRDS OF NORTH AMERICA. By Frank A. Bates.	1.00
SPARROWS AND FINCHES. By C. J. Maynard. Illustrated.	1.50
KEY TO THE WATER-BIRDS OF FLORIDA. By C. B. Cory. Illustrated.	1.75
EATON'S FERNS OF NORTH AMERICA. 81 Colored Plates, 2 Vols.	40.00
GOODALE'S WILD FLOWERS OF AMERICA. 51 Colored Plates.	7.50
BRITTON & BROWN'S FLORA OF THE NORTHERN U. S. Illustrated, per vol.	3.00
CHAPMAN'S FLORA OF THE SOUTHERN STATES. New Edition.	4.00
DODGE'S FERNS AND FERN ALLIES OF NEW ENGLAND.	.50

BRADLEE WHIDDEN, PUBLISHER, 18 Arch Street, Boston.